

# Dark Target Aerosol Retrieval for VIIRS with MODIS Continuity

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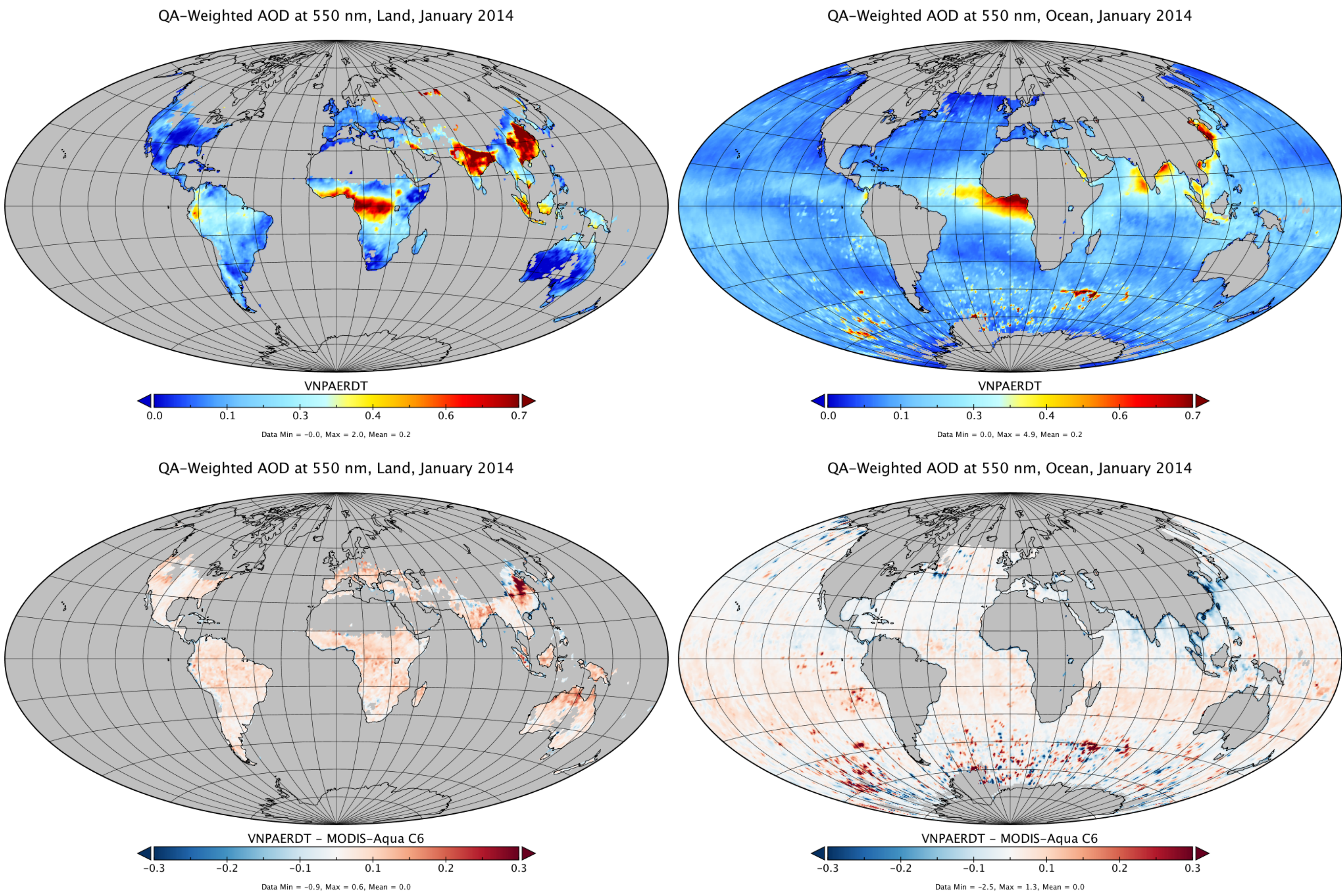
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## Why Dark Target for VIIRS?

- We need global satellite measurements of aerosol optical properties to reduce uncertainties in air quality, cloud and precipitation interactions, and radiative forcing
- Climate trends are detectable only if the data record has continuity over multiple decades
- Dark Target for MODIS data record begins in 1999
- Porting the Dark Target algorithm to newer instruments such as VIIRS extends the record beyond the life expectancy for MODIS aboard Terra and Aqua

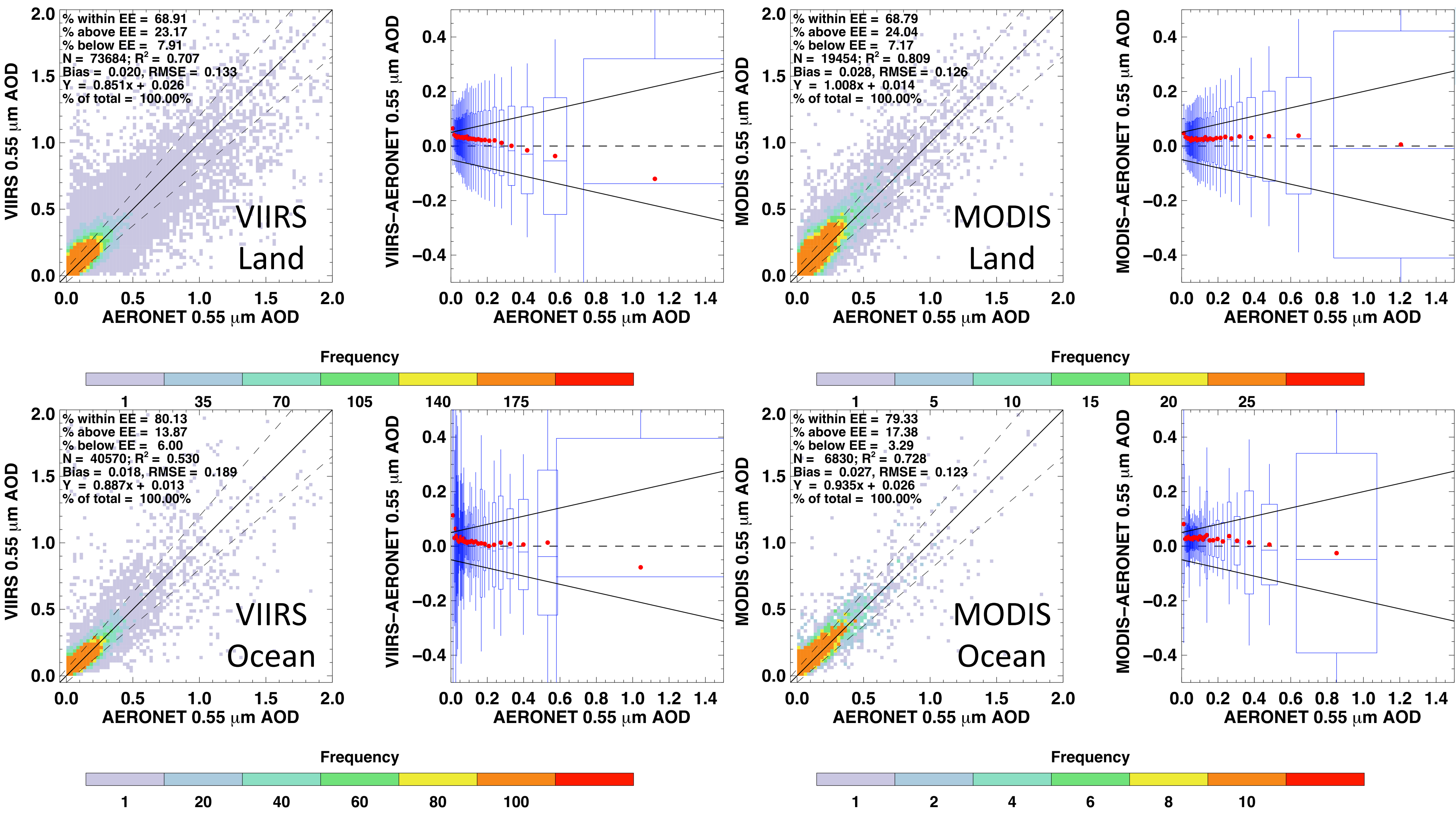
## VNPAERDT

- Operational VIIRS Dark Target product makes changes to previous Intermediate File Format retrievals
- Resolution, granule size, and file format conform to other VIIRS data products, and are partly determined by L1B resolution and swath width
- VIIRS cloud mask ancillary input is new to this version
- Testing on VIIRS data from January 2014 is complete. Moving on to multiyear comparisons to MODIS-Aqua and AERONET



Top: Test version of VNPAERDT for January 2014, land and ocean AOD at 550 nm  
Bottom: Difference between VNPAERDT and MODIS-Aqua C6 over the same period

Dark Target version	MODIS Aqua C6 (MYD04_L2)	VNPAERDT
Nadir resolution	10 km	6 km
Ancillary cloud mask	Wisconsin Cloud Mask (MYD035)	MODIS-VIIRS Continuity Cloud Mask (MVCM)
File format	HDF4	netCDF4
Typical granule size	5 minutes, 203x135 pixels	6 minutes, 404x400 pixels

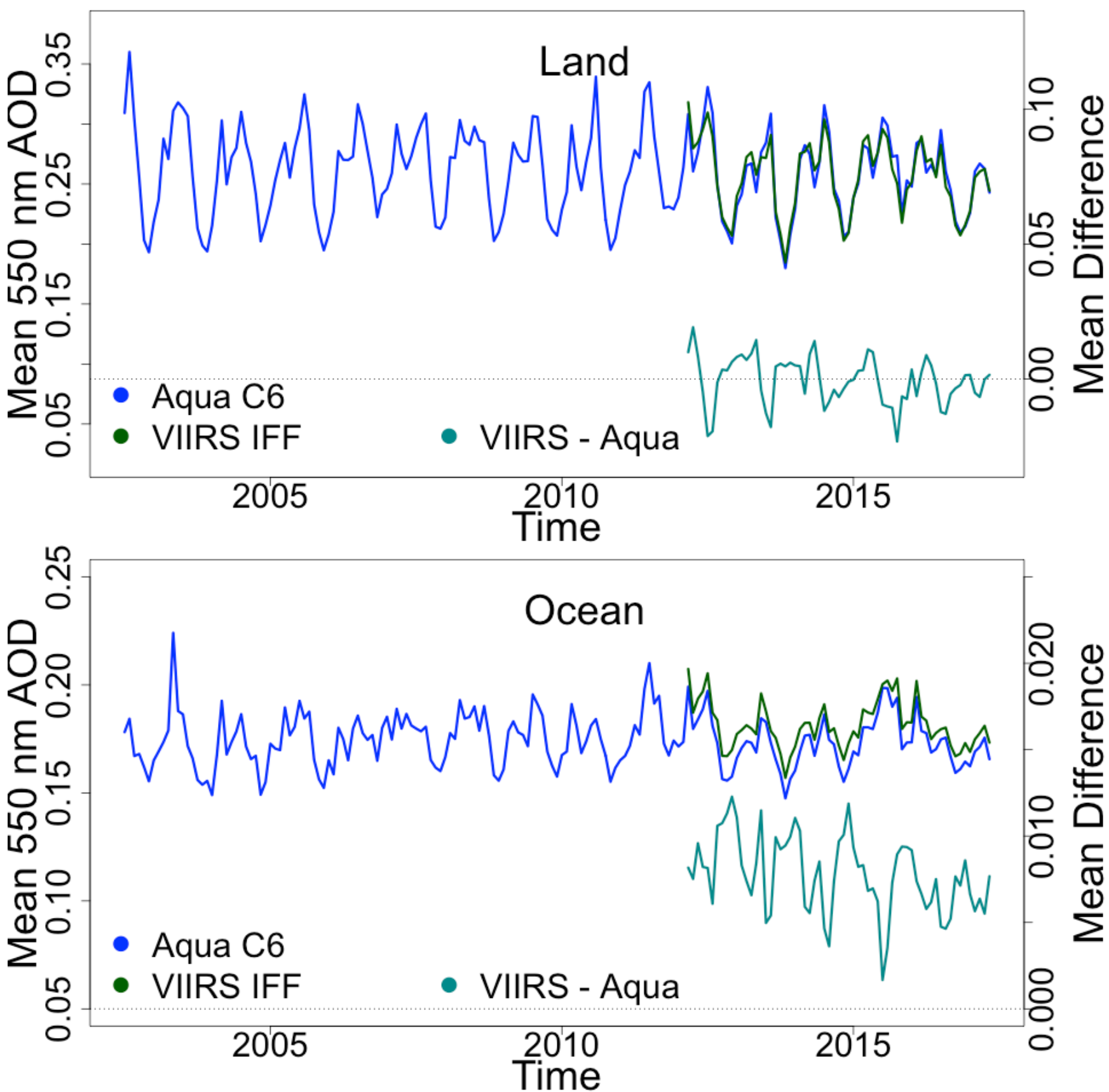


## AERONET Validation

- VNPAERDT collocation with AERONET is available for 2015
- Land validation is restricted to QA flag=3, ocean QA flag $\geq$ 1, no other weighting
- VNPAERDT has many more collocated observations with AERONET than MODIS-Aqua, thanks to larger VIIRS swath
- Overall shape of comparison and percent within expected error is similar to MODIS-Aqua vs. AERONET
- Large unexpected drop in  $R^2$  values for land and ocean as compared to MODIS-Aqua

## Next Steps

- All VIIRS retrievals (including NOAA VIIRS) have large differences to MODIS in the Southern Ocean. Is this cloud contamination, or an effect of limited sampling?
- Longer-term VNPAERDT test retrievals will allow a more thorough test of regional and seasonal differences from MODIS-Aqua
- Running VNPAERDT for the full length of the VIIRS mission will allow us to check for trends and persistent bias.
- MODIS-VIIRS continuity may require calibration adjustments to VIIRS reflectances, as other groups have already calculated.
- Validation to something other than AERONET collocation



Area-weighted, QA-weighted 550nm AOD over the entire MODIS-Aqua and VIIRS missions (left axis) and the difference between the two (right axis). VIIRS data is from IFF.